NEIGHBORHOOD CONDITIONS AND HEALTH DISPARITIES

Do neighborhood conditions contribute to racial and ethnic disparities in health and health service utilization?

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EXECUTIVE SUMMARY

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Statement of the Problem

Given that health disparities affect people by age, race/ethnicity, socioeconomic status (SES), and gender, and tend to cluster geographically, the investigation of both social processes and the contextual environment is a promising means to identify population level factors that may be in the causal pathway. This study examined several neighborhood structural variables, defined and measured independently of the neighborhood residents, to determine if they are associated with social processes, with individual level health risk behaviors, with health care utilization and with population level health outcomes.

Research Objectives

1) Primary aim: To examine the role of neighborhood factors, including residential segregation and access to community resources on health status, health behaviors, and health services utilization.

2) Secondary Aim: To determine if "collective efficacy" measured at the neighborhood level, mediates the association between neighborhood factors and individual risk behaviors, health outcomes and health care utilization.

Study design and methods

Our study was a secondary data analysis of cross sectional data obtained through the Los Angeles family and Neighborhood Survey (LAFANS). Our analysis techniques include use of ecological and geographic data combined with surveys collected from families nested within block groups and census tracts within Los Angeles County. We used multi-level modeling to identify the contribution of the local environments to health outcomes as distinct from the contribution of individual level factors.

Findings

We were fortunate to have several graduate students, fellow and research associates available to help work on this project. This made it possible to explore our data in very different directions. After we explored the data to test our initial hypotheses, we found little support for our hypotheses with respect to health care, and more robust support with respect to collective efficacy. It's possible the health care items were not as fruitful because the items to measure them were not well defined. In addition to analyzing LA FANS data we also were able to complete analyses of data that were collected to describe the availability of after school activities in public high schools in Los Angeles.

Our findings included:

1) Smaller schools and school serving disadvantaged students offered fewer after school activities.

2) The offering of activities for sports was associated with lower rates of juvenile arrests in local neighborhoods and lower rates of teen pregnancy.
3) Overweight and at-risk for overweight was associated with collective efficacy among adolescents, with more than a 2 fold risk of overweight in low collective efficacy neighborhoods compared to high collective efficacy neighborhoods
4) Parks are associated with higher levels of collective efficacy while alcohol outlets and economically heterogeneous neighborhoods are associated with lower collective efficacy.
5) Neighborhood environments are associated with self-rated health, and exposure to other environments masks the effect that residential neighborhoods have.
6) BMI is related to where people buy groceries such that shopping in a higher SES neighborhood relative to ones residential neighborhood is associated with a lower BMI.
7) Collective efficacy is associated with lower rates of teen pregnancy, but not in Latino neighborhoods.

Recommendations

Public health professional need to expand the portfolio of health promotion interventions to consider the role of neighborhood social and physical environments in health. In particular opportunities for a healthy diet and exercise are critical. The opportunities include not only facilities for exercise and diet, but also organized programs to engage people in physical activity, and possibly programs to help people choose healthy foods. The tools for regulation of local environments have not been placed under the aegis of health professionals, but controlled by city planners, who may be more influenced more by business concerns and the marketplace than by public health issues. The impact of neighborhood design on health is in its infancy and much additional work is needed so that the relationships can be clarified and applied on a routine basis.

List of Products

Peer reviewed articles

1. Cohen, DA, Finch, BK, Bower A, Sastry, N. Collective efficacy and obesity: the potential influence of social factors on health, Social Science and Medicine 2005 (in press)

2. Non-Residential Neighborhood Exposures Suppress Neighborhood Effects on Health by Sanae Inagami, Deborah Cohen, and Brian K Finch (under review)

3. Hispanic Concentration and the Conditional Influence of Collective Efficacy on Teen and Nonmarital Birth Rates: Sandra Way, Brian Finch, Deborah Cohen (under review)

4. Inagami, S, Finch, Cohen, You are where you shop: Residential neighborhoods, body mass index, and grocery store locations.(under review)

5. The Built Environment and Collective Efficacy. Spatial Determinants of Social Interaction: Deborah Cohen, MD, MPH Brian K. Finch, PHD Aimee Bower (under review)

6. Availability of High School Extra-Curricular Sports Programs ; Deborah A. Cohen, MD, MPH, Stephanie L. Taylor, PhD, MPH; Michela Zonta, MA; Katherine D. Vestal, MPH, Mark A. Schuster, MD, PhD (under review)

7.Opportunities for Extra-Curricular Activities at Los Angeles County Public High Schools: Project memorandum PM-1753-CDC-HRSA

Abstracts

Cohen, D, Finch, B and Bower, A: Collective Efficacy and BMI Chronic Disease National Conference on Chronic Diseases Feb 18-20, Wash DC

Cohen, D. Broken Windows and Health: Housing, Collective Efficacy, and Health Outcomes, Abstract #109413 Deborah A. Cohen, MD, MPH, APHA, December 2005, Philadelphia.

Finch, B. "Community Collective Efficacy and Adolescent Health in Los Angeles." 2003 Population Association of America, Minneapolis, May 1-3.

Way, Sandra "Hispanic Concentration and the Conditional Influence of Collective Efficacy on Teen and Non-Marital Birth Rates" Presented at the Pacific Sociological Association Meetings, Portland, OR, April 2005.

Inagami S, Cohen DA, Finch BK Non-Residential Neighborhood Exposures Suppress Neighborhood Effects on Health. . Society of General Internal Medicine Conference. New Orleans. May 14, 2005.

Inagami S, Cohen DA, Finch BK, Asch SM. You Are Where You Shop: Residential Neighborhoods, Grocery Store Locations and Body Mass Index. American Public Health Association Conference. Philadelphia. Scheduled for December 12, 2005

Presentations

Cohen, DA, Special Panel on Childhood Obesity, Academy Health, June 8, 2004

Cohen, DA. Speaker, Public Health and GIS Symposium, University of Pennsylvania, June 21, 2004

Cohen, DA Pennington Biomedical Research Institute, October, 2004

Inagami S, Cohen DA, Finch BK. Non-Residential Neighborhood Exposures Suppress Neighborhood Effects on Health. American Public Health Association Conference. Philadelphia. Scheduled for December 13, 2005.

NEIGHBORHOOD CONDITIONS AND HEALTH DISPARITIES

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I. Introduction:

a. Nature of the Research problem

Given that health disparities affect people by age, race/ethnicity, socioeconomic status (SES), and gender, and tend to cluster geographically, the investigation of both social processes and the contextual environment is a promising means to identify population level factors that may be in the causal pathway. This study examined several neighborhood structural variables, defined and measured independently of the neighborhood residents, to determine if they are associated with social processes, with individual level health risk behaviors, with health care utilization and with population level health outcomes.

b. Purpose scope and methods of investigation

Two types of analyses were undertaken—multi-level and ecological. We used coded data linking the behaviors of individuals with surveillance data (injury mortality, and teen birth data) to neighborhoods of residence. We also used geocoded data on the location of alcohol outlets and the location of public parks. We also collected data from local schools to find out the availability of after school activities. We obtained land use data from the County of Los Angeles and maps of parks and street patterns. All these data sources made it possible to examine how the physical and social structures of urban and suburban landscapes are associated with health risk behaviors and health outcomes.

Our focus was on health problems that are of increasing importance to youth and adolescents: obesity, injury, asthma, and teen pregnancy. All of these disproportionately affect low-income populations of minority status and may, in part, be related to neighborhood level factors.

3) Primary aim: To examine the role of neighborhood factors, including residential segregation and access to community resources on health status, health behaviors, and health services utilization.

4) Secondary Aim: To determine if "collective efficacy" measured at the neighborhood level, mediates the association between neighborhood factors and individual risk behaviors, health outcomes and health care utilization.

c. Nature of the findings

In our initial exploration of the LA FANS database, relatively few adolescent subjects were sexually active or had become pregnant and so we did not pick up any associations with local environments and these outcomes. However the ecological data on teen pregnancy and out of wedlock childbirth did indicate an association with "collective efficacy". There were few adolescent deaths from injuries as well in the census tracts of subjects. We also found no associations with "asthma", but this may be because the report of asthma may be more subjective than that of the other outcomes. The main condition where we found robust associations was

related to BMI, teen pregnancy rates, and self-rated health as many participants were overweight or at risk for overweight, so we focused the investigations around this subject. .

II. Review of the Literature

There are several possibilities through which the neighborhood of residence (representing the immediate social and physical structural environments for youth) may or may not be associated with health risk behaviors, health outcomes, and access to health services:

1) People who live near each other influence each other; they set norms of behavior relating to their health habits (e.g. sexual behavior and substance use);
2) People who live in the neighborhood provide (or fail to provide) social support and/or monitoring;
3) Resources available in the environment may facilitate or constrain healthy behaviors (e.g. recreational facilities vs. alcohol outlets) or facilitate access to health services (and the presence of these resources may be a function of the SES composition of the neighborhood);
4) Physical design of the area constrains/facilitates health (e.g. common entryways may facilitate social interactions and social support)(Fleming, Baum et al. 1985);
5) Or the association is spurious, because people self-select into their neighborhood of residence. (Jencks and Mayer 1990; Leventhal and Brooks-Gunn 2000)

Neighborhood structural factors have been studied with respect to their influence on violent crime (Sampson, Raudenbush et al. 1997), juvenile delinquency (Sampson and Groves 1989), and educational attainment (Brooks-Gunn and Duncan 1997), but there are only a limited number of studies that have examined the role of neighborhood factors in sexual and drug use behaviors or objective health outcomes such as mortality (Leventhal and Brooks-Gunn 2000). Factors that promote poor health habits may be geographically concentrated in particular neighborhoods and may explain the disparities in health associated with race and socio-economic status (Gillies, Tolley et al. 1996).

One criticism of neighborhood level studies of risk behaviors has to do with the possibility that any observed difference may be due to the pre-existing characteristics of individuals who choose to live in the neighborhoods rather than being a consequence of living in the neighborhood. To address this possibility, a recent housing mobility study, Moving to Opportunity (MTO), used a randomized controlled experimental design and gave persons living in housing projects in high poverty areas the opportunity to be in a lottery to move to a low poverty neighborhood. The initial experimental evidence from the Boston MTO project indicates that the health of the lottery winners who moved from high poverty areas to low-poverty areas improved compared to the lottery losers who remained in high-poverty areas (Katz, Kling et al. 2000). These health improvements included lower rates of injuries and fewer asthma attacks among household children. Another evaluation of the MTO project in Baltimore showed a decline in juvenile crime associated with neighborhood change (Ludwig, Duncan et al. 1999). Some of the inferred mechanisms related to increased safety in low-poverty areas. However, social and physical conditions of these high and low poverty environments were not explicitly and completely measured, and these may have contributed to the health outcomes. The MTO demonstrates that neighborhoods matter, but was not intended to be a feasible model for solving neighborhood problems. The challenge is to identify remediable neighborhood structural factors that can optimize the health and well-being of residents. The study we are proposing will focus

on this task with respect to a variety of health outcomes and health care utilization. While studies of neighborhoods that people choose to live in can never completely differentiate between neighborhood influences and pre-existing individual level behavioral proclivities, neighborhood level studies can begin to describe how remediable structural factors vary with health behaviors. Interventions can then test whether these factors are causally associated with health.

Previous studies that have looked at how neighborhoods affect youth development have described potential mechanisms as to how the built physical and social environments affect youth development. In one study youth who live in neighborhoods with a lower density of youth, or hilly terrain, had less opportunities to interact with others. Youth who lived in neighborhoods rich in resources for safe play and interaction appeared more skilled in understanding others and developed greater sense of personal control (Parke and O'Neill 1999). UC Riverside's Social Development Project concluded that youth development was highly related to neighborhood quality. Children with opportunities to explore and direct their own activities developed a greater sense of self-efficacy. In contrast, in neighborhoods that were perceived as threatening, youth activities were more restricted and youth were more likely to be described as lonely (Parke and O'Neill 1999).

In a review of neighborhood effects on youth, Leventhal and Brooks-Gunn (Leventhal and Brooks-Gunn 2000) identified several areas where neighborhoods have been shown to make a difference in youth development: school readiness and achievement, and sexuality and childbearing. There was less consistent evidence for neighborhood effects on behavior and emotional health. In the areas of physical health, there are known association between SES and outcomes like asthma and obesity among youth, but these have not been clearly linked to neighborhood of residence, independent of SES (Lindquist, Reynolds et al. 1999; Gold 2000). The association between asthma and obesity may indeed be mediated by neighborhood conditions, in that parents may restrict youth to indoor play where neighborhoods may not be safe. Staying indoors increases exposure to cockroach allergens (associated with asthma) (Kattan, Mitchell et al. 1997; Gold, Burge et al. 1999) and increases sedentary behavior, a cause of obesity.

Most studies of the effect of neighborhoods on youth examine only the compositional characteristics of other residents, rather than the contextual (physical and social) characteristics in term of local resources. Compositional characteristics refer to the make-up of the area residents in terms of race/ethnicity, education, employment and income. Many studies showed an association between low socio-economic status (SES) neighborhoods and poor outcomes, such as higher mortality (infant and working age) (Malmstrom 1999; Dunn 2000; Bosma 2001) and others have shown that this association in the United States is in part due to segregation (Massey and Denton 1987; Guest, Almgren et al. 1998). Krivo and Peterson (Krivo and Peterson 1996) suggested that the association of extreme disadvantage with violence was independent of race, since it occurred within both disadvantaged white and black communities. Contextual characteristics refer to available resources or land use, such as the availability of parks, schools, markets, and geography, including street design. Neighborhoods of persons of lower SES have higher rates of physical disorder and deterioration and are characterized by social disorder (Shaw and MacKay 1942; Sampson and Groves 1989; Macintyre, MacIver et al. 1993). Lower SES neighborhoods are also more likely to have features which directly promote unhealthier lifestyles, such as alcohol outlets and a lack of healthy foods at grocery stores (Macintyre, MacIver et al. 1993). Therefore, it would be useful to further investigate both the compositional and contextual features of the environment and their association with poor health outcomes. The

proposed study would make a substantial contribution to understanding how a variety of potentially remediable neighborhood factors, controlled by governmental authorities such as city planning boards, licensing and permit authorities, housing authorities and police departments, might affect health.

Besides demographic and geographic features, other dimensions of neighborhood include interactional factors may also affect the health and well-being of youth. The local community is a system of social networks into which people are integrated over time (Kasarda and Janowitz 1974). Neighborhoods are ecological contexts where people meet and choose to interact with certain others, to invest in homes side by side with others, and to satisfy some of their economic and consumer needs together (Hunter 1979). These patterns of interaction, however, are mediated, directed, and constrained by geographic considerations. In cities, these geographic considerations are the built environment. The study we are proposing will be unique in that interactional, geographic, and demographic variables will be accessible.

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III. Study design and methods

A. Study design: Cross sectional

B. Population Studied:

Our studies used data from the Los Angeles Family and Neighborhood Study (L.A.FANS), a countywide longitudinal study of families in Los Angeles County. This study was sponsored by the National Institute of Child Health and Development.

L.A.FANS traces the neighborhood and family roots of children's successes and failures in several areas: cognitive development, school performance, behavioral and emotional development, health, youth violence and crime, drug and alcohol abuse, and adolescent pregnancy. L.A.FANS is being carried out in a representative sample of 65 neighborhoods in Los Angeles County. In each neighborhood, L.A.FANS includes (1) a household survey, including interviews with adults and children, and (2) a neighborhood survey with key informants and social service providers and independent observations of neighborhood physical conditions. Household members are asked questions about education, employment, use of social services, social ties, residential mobility, family life, neighborhood conditions and involvement, and children's well-being. Key informants are being asked about neighborhood conditions and

changes, the business and social service environment, and crime and neighborhood problems. L.A.FANS was specifically designed to answer key research and policy questions in three areas: (1) neighborhood, family, and peer effects on children's development; (2) effects of welfare reform at the neighborhood level; and (3) residential mobility and neighborhood change.

L.A.FANS is specifically designed to study *both* family choices about neighborhoods and the effects of neighborhoods on children. Studying both issues at the same time will provide a solid basis for understanding neighborhood effects on children. L.A.FANS builds on the methodology used in the Project on Human Development in Chicago Neighborhoods described earlier (Sampson, Raudenbush et al. 1997) and obtains both observational data about the social environment and physical condition of neighborhoods, local and family social processes, and individual-level health information. The survey oversamples a low-income, multiethnic population. Taken together, L.A.FANS is an ideal study with which to understand structural determinants of health. While the design of L.A.FANS is longitudinal, the initial effort in the proposed study analyzed the baseline data collected in 2000-2001.

L.A.FANS focuses on the County of Los Angeles, California. Los Angeles County is the largest county in the United States, with the 2000 US census reporting a population of 9,519,338. It is also tremendously diverse in terms of race and ethnic composition. In 2000 when the census asked people to describe themselves as being one or more races, 95% of residents listed one race. Among these, 54% percent were white, 13% Asian, and 10% were Black. Of the total population 45% said they were also Hispanic or Latino. Southern California is a major destination for immigrants to the U.S. According to the 2000 Census, 36 percent of adults in Los Angeles County were foreign born.

C. Sample Selection

The L.A.FANS was designed as a multilevel survey, first sampling neighborhoods, then selecting families within these neighborhoods, and finally sampling children within these families. As discussed below in greater detail, the multistage, clustered sampling scheme has several strengths, as well as certain limitations. Two strengths are worth mentioning here. First, it provides an efficient and cost-effective method for collecting detailed information about households and neighborhoods because the sample is concentrated in a relatively small number of locations. Second, family and neighborhood clustering provide researchers with the opportunity to control for unmeasured or unmeasurable factors at the family and neighborhood levels using, for example, fixed effects or random effects models.

In Los Angeles County, these units include: cities, zip codes, elementary school attendance areas (ESAAs), and census tracts, block groups, and blocks. After examining maps, visiting several areas of the county, and consulting Los Angeles experts, we concluded that census tracts and ESAAs most closely approximate social definitions of neighborhoods, because they are of moderate size (an average of 8,000 inhabitants per ESAA and 5,600 per census tract) and are defined based on social ecological criteria and are generally compact and not crossed by major geographic boundaries (e.g., freeways, major boulevards, and parks). We decided to use census tracts rather than ESAAs as the sampling unit, because tracts generally include children attending two or more elementary schools. Thus, the use of census tracts as sampling units will provide researchers greater scope for examining both neighborhood and school effects on children's development.

Information on how sample size was calculated to take into account design effects, clustering, stratification, and sampling tracts within strata, and block groups within census tracts and households within each tract is included in the appendix in a detailed working paper on the design of LAFANS.

D. Instruments Used.

Our study was secondary data analysis, so we used the data already colleted by LA FANS. Their collection included using validated scales like ”collective efficacy”.

E. Statistical techniques Employed:

Reflecting the unit of measurements of the outcome variables, the data analyses can be grouped into two sets: ecological regressions using aggregate data at the census tract level and multilevel generalized linear regressions using individual level data from the LA FANS.

Aggregate Level Analyses

The first set of regression analyses will concentrate on the influence of neighborhood characteristics on health related aggregate outcomes, measured at the census tract level. The outcome variables include teen pregnancy and injury mortality (aggregated for 1999-2001) of the census tracts in the Los Angeles County. In general, the outcome variables will be expressed as a linear additive product of hypothesized variables. More specifically, $y_i = \beta_0 + \sum_{j=1}^{j=J} \beta_j x_{ij}$, where y_i represents the tract level injury risk outcome for tract *i*, x_{ij} the *j* neighborhood characteristic of tract *i*, and β_j the effect of the neighborhood factor *j*. Theoretically it is desirable to use an appropriate distribution to match with the underlying structure of an outcome variable. For instance, one should use Poisson distribution to model numbers of teen pregnancy. Yet, in practice, it is difficult to incorporate spatial effects into the Poisson (and other non-linear) regression model. As Anselin notes, “when the dependent variable is a count or proportion, … the dependent variable is modeled directly as a random variable with a Poisson or binomial distribution. Introducing spatial dependence into these models is not trivial, since the multivariate versions of discrete distributions are not as tractable as the multivariate normal” (Anselin 1999). As a result, we will apply appropriate transformations to the outcome variables and use the Ordinary Least Square regression model as the base line model.

Multilevel Analyses

We have conceptualized health behaviors of youth as a result of multilevel factors: child’s own characteristics, his/her family, and characteristics of his/her neighborhood. Within this framework, children living in the same family and the neighborhood share the influence of higher level factors. Individual children are “nested” within the different levels of context. Failure to properly address such nested structure in the data leads to biases in both parameter estimates and their standard errors. To further complicate the matter, the outcome variables of the study are measured in discrete scales.

There are several alternative approaches in dealing with such nested data (for a review, see (Pendergast, Gange et al. 1996)). We proposed to use multilevel generalized linear models. These models are also known as generalized linear mixed models (Neuhaus 2001), hierarchical non-linear models (Raudenbush and Bryk 2001), and random-effects regression models (Hamerle and Ronning 1995).

The main advantage of such models is that these models allow researchers to estimate effects of factors measured at various levels. For instance, an alternative approach called fixed-effects regression models could be used with nested data. Unlike fixed-effects models for continuous outcomes, fixed-effects models for categorical outcomes use conditional likelihood approach (Hamerle and Ronning 1995). The main drawback of fixed-effects models is that researchers cannot estimate effects of variables measured at higher levels. For example, if we apply such models to the LA FANS at the neighborhood level, we will not be able to estimate influence of neighborhood level covariate such as neighborhood collective efficacy, which is the central interest of the study.

We can express a multilevel generalized linear regression model (McCulloch 2001) as: $g\left(\mu_{ijk}\right) = X'_{ijk}\beta_{jk} + F'_{jk}\gamma_k + N'_k\theta + f_{jk} + n_k$, where $\mu_{ijk} = E\left(y_{ijk} \middle| X_{ijk}, F_{jk}, N_k, f_{jk}, n_k\right)$ denotes the mean of the conditional distribution of the outcome variable y_{ijk} for a child *i* in a family *j* living in a neighborhood *k*, given a set of covariates representing different child, family and neighborhood X_{ijk}, F_{jk}, N_k, unobserved factors f_{jk}, n_k at family and neighborhood levels, respectively, and *g*(.) is a link function (such as the logit for binary data and the log for count data). The model assumes that f_{jk}, n_k are normally distributed.

We can illustrate the proposed analyses using a simplified multilevel model, depicted in Figure 2.[1] As we have discussed, the ecological model of child development suggests that family process and child development are embedded in neighborhood structure. Figure 2 shows an analytical model indicating, for illustration sake, how neighborhood collective efficacy (*C.E.*), family connectedness (*F.C.*), and child's self-efficacy (*S.E.*) affect the child's drug use. The outcome variable is a dummy variable indicating whether a child uses drug. We can formulate a reduced form regression equation as:
$\log\left(p_{ijk} \big/ \left(1 - p_{ijk}\right)\right) = \beta_{1jk}\left(S.E.\right)_{ijk} + \gamma_{1k}\left(F.C.\right)_{jk} + \theta_1\left(C.E.\right)_k + \theta_0 + f_{jk} + n_k$, where β_{1jk} captures the effect of child self-efficacy, γ_{1k} reflects the effect of family connectedness, and θ_1 is the effect of community collective efficacy on the likelihood of the child's drug use. In addition, f_{jk}, n_k capture effects of any unmeasured factors associated with family and neighborhood characteristics.

The proposed regression model has several advantages over traditional regression models. It provides a convenient framework to study how multilevel factors influences the outcome variable. More importantly, it provides correct parameter estimates and their standard errors. In addition, the model is quite flexible to estimate cross-level interactive effect and correlations across contextual units.

[1] Adopted from Earls and Carlson 2001: Figure 1.

IV. Presentation of Findings

Hypothesis #1: In communities with higher rates of collective efficacy, youth will be less likely to engage in risk behaviors (e.g. unprotected sex, substance use, and weapon carrying) after controlling for race, gender and SES and more likely to engage in health promoting behaviors (e.g. exercise, routine health check-ups).

We did not find any relationship between collective efficacy and the above risk behaviors or health promoting behaviors. The only indicator of unprotected sex we had was self-report of pregnancy. Our sample size was too small to find any individual level results in the data. However, we did find associations between pregnancy rates and collective efficacy as reported in the attached paper.

We found that the relationship between collective efficacy and birth rates is conditioned by the concentration of Hispanic residents. In less concentrated neighborhoods, collective efficacy is associated with lower birth rates. This result was not found for segregated Hispanic neighborhoods, where collective efficacy was associated with higher teenage birth rates. (Way, et al, 2005)

Hypotheses # 2: High levels of community level collective efficacy will be associated with lower rates of injury mortality and teen pregnancy at the census tract level, independent of race and SES.

We found no relationship between injury mortality and collective efficacy at the census tract level, however, we did have mixed findings on teen pregnancy (see above).

Figure 1. Effects of Collective Efficacy on Teen and Nonmarital Birth Rates by Hispanic Concentration

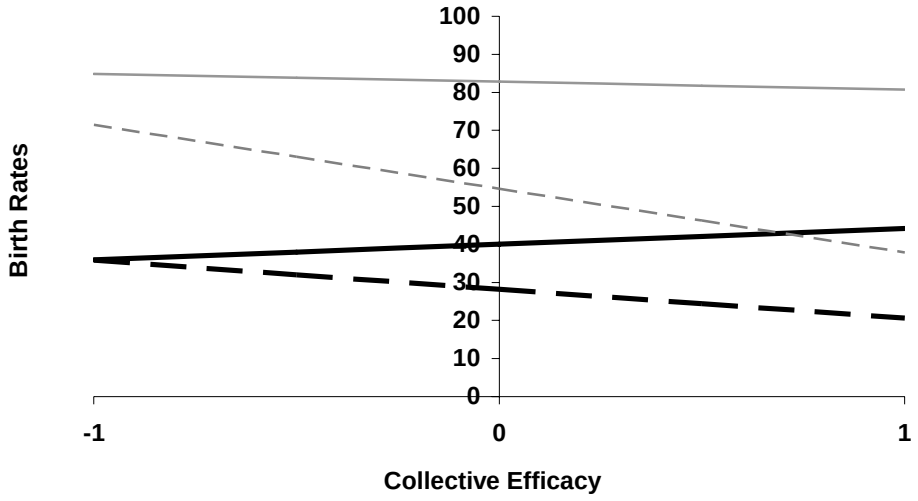

Table 1: Multivariate Regression Analysis for the Effects of Neighborhood Collective Efficacy and Hispanic Concentration on Teen and NonMarital Birth Rates

	Teen Birth Rate (10-19yrs)		Non Marital Birth Rate (20-44yrs)	
	Model 1	Model 2	Model 1	Model 2
Intercept	30.8** (28.16, 33.44)	28.23** (24.81, 31.64)	63.46** (58.63, 68.29)	54.66** (48.25, 61.07)
Collective Efficacy	-6.85** (-11.44, -2.26)	-7.59** (-12.23, -2.96)	-15.15** (-23.56, -6.75)	-16.8** (-25.51, -8.09)
Tract Disadvantage	7.42** (2.82 ,12.01)	5.14* (0.62, 9.67)	10.07* (1.67, 18.47)	5.46 (-3.97, 13.97)
% Foreign Born		15.66 (-7.91, 39.23)		-8.34 (-52.64, 35.96)
% Black		30.88 (-0.65, 62.34)		64.23* (5.00, 123.46)
75% Hispanic		11.82** (5.61, 18.04)		28.13** (15.45, 39.81)
75% Hispanic*Collective Efficacy		11.71** (5.6, 17.81)		14.71* (3.24, 26.19)
Adjusted R2	0.545	0.661	0.528	0.63

N=86, Numbers in parentheses are 95% Confidence Intervals *p<.05, **p<.01

As predicted, even after accounting for the higher rates associated with neighborhood disadvantage, Model 1 (Table 1) indicates that neighborhoods with high collective efficacy tend to have lower teen and non-marital birth rates. The reduction in the collective efficacy coefficient with the inclusion of racial, ethnic and foreign-born neighborhood concentration in Model Two, suggests that this relationship is mediated by the racial and ethnic composition of the community. Furthermore, the significant interaction in model 3 supports the hypothesis that the relationship between collective efficacy and teen and non-marital birth rates depends on the ethnic composition of the neighborhood. As shown in Figure 1, in less Hispanic concentrated neighborhoods the relationship is in the expected direction, as the amount of collective efficacy in neighborhoods increases the teen and non-marital birth rates decrease. In neighborhoods with a high percentage of Hispanic residents (75% or more), however, collective efficacy is not related to lower birth rates. In fact, the graph shows teen birth rates slightly increasing with higher levels of collective efficacy.

Hypothesis #3: Communities with fewer opportunities for youth supervision, lower perceived safety, more alcohol outlets, more boarded up homes and physical disorder, lower residential stability, and more low-achieving schools will have more youth who are overweight or obese and have asthma after controlling for race, gender and SES.

We found a very strong relationship between collective efficacy and rates of adolescent overweight and obesity, but no relationship with asthma. Using a two-level model, we find

significant relationships between collective efficacy and all three outcomes, net of levels of neighborhood disadvantage. The associations between BMI and collective efficacy could potentially be explained by several factors, including a metabolic pathway, neighborhood differences in the physical and social environments, or a combination of these two. If group-level collective efficacy is indeed important in the regulation of individual-level net energy balance, it suggests that future interventions to control weight by addressing the social environment at the community level may be promising.

Table 3. Unadjusted and Adjusted Effects for BMI (Predicted Values), Overweight (Odds Ratios), and Obesity (Odds Ratios) among Adolescents in the Los Angeles Family and Neighborhood (LAFANS) Survey.

	Body Mass Index		Overweight		Obesity	
	Unadjusted BMI (95% CI)	Adjusted BMI† (95% CI)	Unadjusted OR (95% CI)	Adjusted OR† (95% CI)	Unadjusted OR (95% CI)	Adjusted OR† (95% CI)
Collective Efficacy‡						
High	20.40 (19.81-20.98)	21.22 (20.23-22.20)	0.31 (0.14-0.68)	0.49 (0.30-0.79)	0.44 (0.35-0.55)	0.59 (0.35-1.01)
Medium	22.47 (21.88-23.06)	22.47 (21.48-23.46)	1.00 (ref)	1.00	1.00 (ref)	1.00 (ref)
Low	24.57 (23.98-25.16)	23.72 (22.73-24.70)	3.18 (1.46-6.90)	2.03 (1.26-3.27)	2.28 (1.81-2.88)	1.69 (0.99-2.89)

Abbreviations: CI, Confidence Interval; OR, Odds Ratio; BMI, Body Mass Index; ref, reference category
†Multivariate adjusted for full set of variables listed in Table 1 with a three-level random-intercept hierarchical generalized linear model; both unadjusted and adjusted effects of collective efficacy on BMI and overweight, and unadjusted effects on obesity are significant at $p<.05$; adjusted effects on obesity are significant at $p<.085$. We use weighted data for the linear models given the flexibility of current estimators to incorporate weights, but use un-weighted data for the logit models as neither Stata nor HLM software allows for the use of sampling weights in their multilevel modeling sub-routines.
‡Collective Efficacy is a log-linear term in the regression models, but is represented by discrete categories for the predicted values/odds ratios presented above including: low (two standard deviations below the mean), medium (mean), and high (two standard deviations above the mean). For the linear model of BMI, values presented are predicted values of BMI for each level of neighborhood collective efficacy. For the logit models of overweight and obesity, high and low levels of neighborhood collective efficacy are compared with medium levels of neighborhood collective efficacy.

Table 4. Unrestricted Hierarchical Logistic Regression Model of Overweight Status: Unstandardized Coefficients (logits).

Variable	β(S.E.)
Contextual Predictors	
Ln(Collective Efficacy)	-6.402(2.814)*
Ln(Neighborhood Disadvantage)	-0.343(0.426)
Child-Level Predictors	
Age (years)	-0.148(0.077) †
Sex [Male]	
Female	-0.465(0.247)†
Race/Ethnicity [NH White]	
Latino/Hispanic	0.024(0.637)
NH Black	0.176(0.613)
NH Other	0.126(0.591)
Nativity [1 Parent foreign-born]	
Both Parents Born in US	-0.252(0.371)
Extracurricular Activities (count)	0.061(0.076)
Hours of TV per day	0.092(0.082)
Primary Care Giver (PCG) Predictors	
Marital Status [Married]	
Unmarried[a]	0.237(0.434)
Family Type [Single Parent HH] [a]	
Both Parents in HH	0.157(0.337)
PCG Education (years)	-0.042(0.040)
Family-Income (imputed)	0.001(0.001)
Employment Status [Both Parents Unemployed] [a]	
≥One Parent Employed	0.471(0.398)
Health Insurance [Private] [a]	
Government Insurance	-0.284(0.361)
No Insurance	-0.202(0.363)
Adult BMI	0.094(0.021)**
Intercept	5.870(3.009)
{Total n-size}	{807}

†p<.10; *p<.05; **p<.01
a: Dummy Variables for missing data are included in the regression models but not reported here.

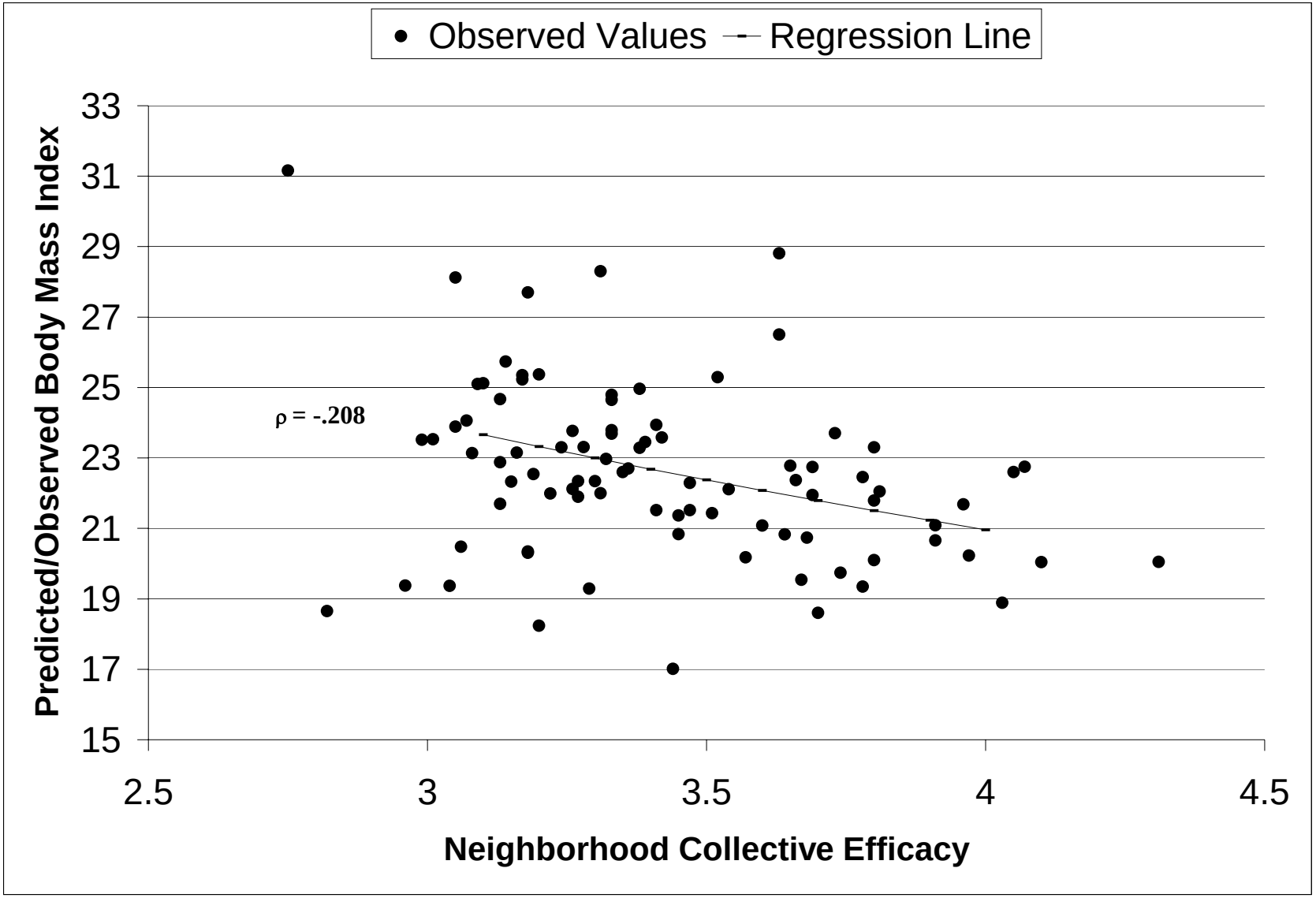

Figure 1. Child's Body Mass Index by Neighborhood Collective Efficacy: Regression Line and Observed Averages.

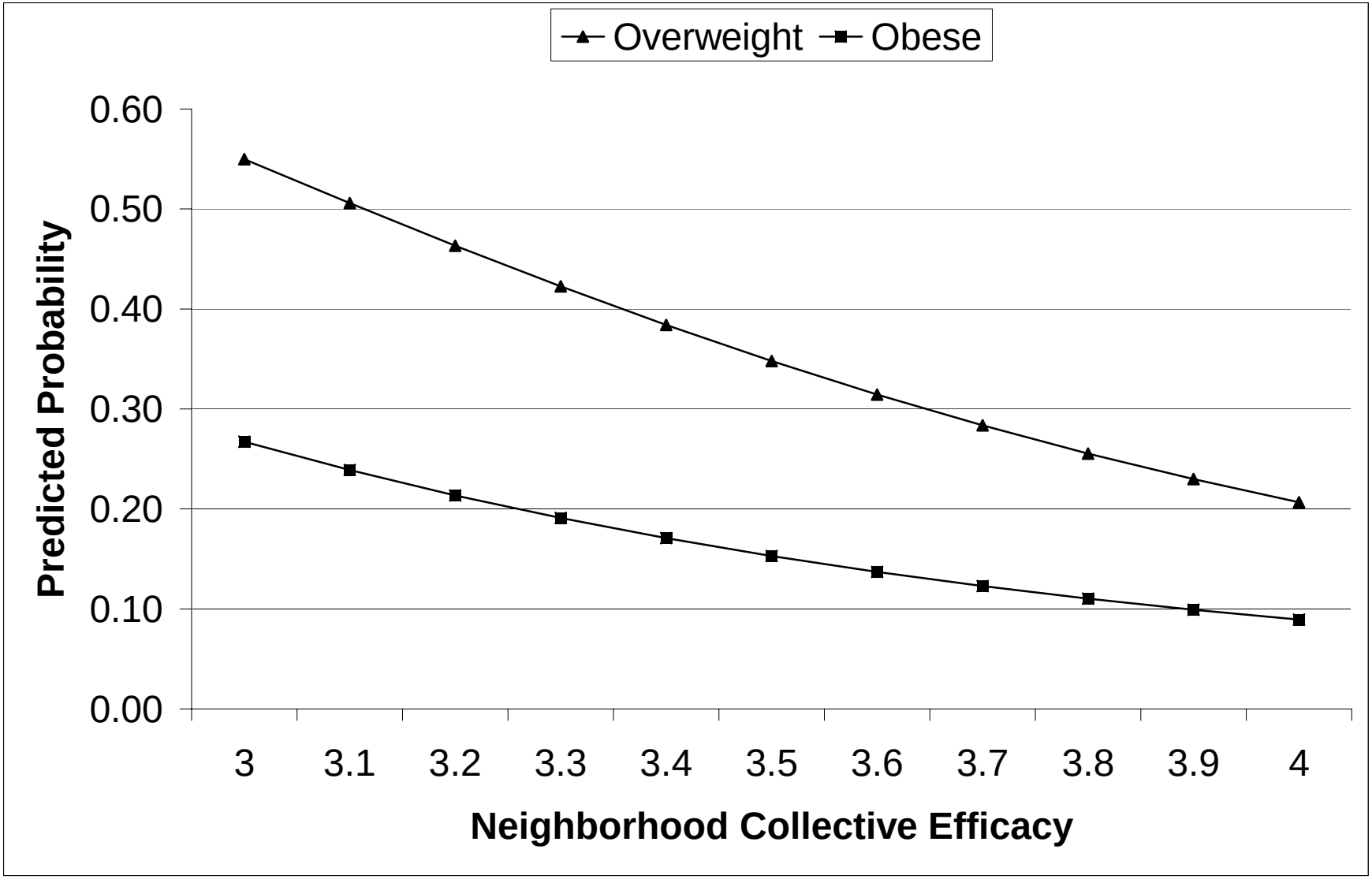

Figure 2. Predicted Probabilities for Overweight and Obesity by Levels of Neighborhood Collective Efficacy.

Hypothesis #4: Collective efficacy will mediate the relationship between boarded-up housing and physical disorder, neighborhood stability, alcohol outlets, and utilization of routine versus emergency health care services.

We did not find a pathway as anticipated in our initial proposal. Instead, we found that certain neighborhood conditions predicted collective efficacy. For example, the presence of parks was associated with higher collective efficacy, and the presence of alcohol outlets was associated with lower collective efficacy. We did not find associations between collective efficacy and fast food outlets or block length.

Table 3. Hierarchical Linear Regression Model of Collective Efficacy.

	Model 1	Model 2	Model 3 (¼ mile)	Model 4 (1 mile)
Individual-Level Variables				
Age (years)		.0033(.0009)**	.0026(.0009)**	.0025(.0009)**
Education (years)		-.0022(.0037)	-.0098(.0036)**	-.0099(.0037)**
Family Income ($10k)		.0068(.0015)**	.0036(.0015)*	.0035(.0015)*
Male (reference)				
Female		-.0333(.0252)	-.0389(.0247)	-.0378(.0247)
Race/Ethnicity (NH White)				
Latino		-.0521(.0412)	.0648(.0418)	.06571(.0416)
NH Black		-.0523(.0536)	.0783(.0538)	.0719(.0537)
NH Other		-.0807(.0485)†	-.0204(.0478)	-.0228(.0476)
Missing		.2000(.2583)	.2913(.2537)	.2913(.2537)
Tract-Level Variables				
ICE			.8833(.0952)**	.9279(.0912)**
Off-sale Liquor Stores			-.4974(.2741)†	-.5369(.2592)*
Number of Parks			.0193(.0092)*	.0053(.0041)
Fast Food Outlets			.0128(.0410)	.0008(.0029)
Constant		*3.3767*	*3.4063*	*3.4617*
σ_u	.2972	.1596	.1249	.1258
σ_e	.6131	.6095	.6094	.6095
ρ (Intra-Tract Correlation)	.1902	.0641	.0403	.0408
n	2,598	2,598	2,598	2,598
Reduction in Level-2		46.29%	57.97%	57.67%

Variance

Note: **p<.01; *p<.05; †p<.10; dummies for missing values are included in the analysis to maintain sample size but are not reported in the regression table.

Table 4. Characteristics of Tracts with Low and High Levels of Collective Efficacy.

	High Collective Efficacy	Low Collective Efficacy
ICE	.3281	-.3094
Off-Sale Liquor Stores	.0056	.0931
Number of Parks	11.24	8.21
Fast Food Outlets	10.01	6.58
Block Length	.2559	.1824

Note: High collective efficacy is defined as a respondent living in a neighborhood with efficacy scores that are larger than one standard deviation above the mean while low efficacy neighborhoods are defined as one standard deviation below the mean. As such, the characteristics of neighborhoods at the average are represented by the descriptive characteristics in Table 2.

Additional data exploration: Neighborhood exposures, Self-rated health and BMI.

Dr. Sanae Inagami, a post-doctoral fellow also worked on this project and developed manuscripts exploring the relationship of neighborhood exposures and exposure to places outside ones neighborhood on self-rated health. She also looked at the role of where people usually purchase groceries and their BMI. In the first study she found that self-rated health improves when people spend more time in neighborhoods of higher SES, assuming they lived in a low SES neighborhood. Similarly, people had lower BMIs if they shopped for groceries in neighborhoods with a higher SES than compared to where they lived.

Table 2: Multivariate Hiearchical Linear Models of Non-Residential Neighborhood Exposures and Residential Neighborhood Exposures on Self-Rated Health*

	Total Sample (n=3358)					
	Model A [d]		Model B		Model C [e]	
	β	p	β	p	β	p
Residential SES: Very Low	-.423	.000	-.517	.000	-.572	.000
Residential SES: Low	-.288	.000	-.360	.000	-.395	.000
Residential SES: High	-.129	.108	-.157	.044	-.171	.030
Residential SES: Very High	Reference Category					
High Exposure to More Advantaged Non-Res Neighborhoods			.215	.001	.199	.003
Mid Exposure to More Advantaged Non-Res Neighborhoods			.146	.025	.126	.057
Low Exposure to More Advantaged Non-Res Neighborhoods			.058	.256	.037	.480
Exp to Non-Res Neighborhoods Similar to SES of Residence	Reference Category					
Exposure to Less Advantaged Non-Res Neighborhoods					-.090	.094
Latino	-.327	.000	-.299	.000	-.290	.000
Black	-.035	.645	-.024	.754	-.013	.863
Whites, Asians, Others	Reference Category					
Log Income	.004	.687	.002	.805	.003	.785
Car Ownership	.180	.000	.168	.000	.167	.000
Log Age	-.732	.000	-.734	.000	-.728	.000
College	.413	.000	.415	.000	.418	.000
Employed	.265	.000	.245	.000	.251	.000
Female	-.149	.000	-.147	.000	-.146	.000
Married	.039	.302	.041	.287	.039	.311
Intercept	.152	.534	.194	.425	.226	.355

[*]Self-Rated Health: 1=Poor Health, 5=Excellent Health. [a]Model A: Model does not include exposure to non-residential neighborhoods. [b]Model B: Model includes exposure to graded doses of more advantaged non-residential neighborhoods. [c]Model C: Model includes exposure to disadvantaged and graded doses of more advantaged non-residential neighborhoods

Table 3. Relative Risk (RR) of Fair/Poor Health

Low Income: Relative Risk of Fair/Poor Health if All Exposed to Residential SES Neighborhood Compared to if All Exposed to Very Hi SES Residential Neighborhoods								
	Non-Residential Exposures Excluded		Non-Residential Exposures Included					
	Residential SES Effect Only		Residential SES Effect Controlling for Non-Residential Exposure		If all also exposed to Disadvantaged Non-Residential Environments		If all also exposed to Advantaged Non-Residential Environments	
Residential SES	RR	CI*	RR	CI	RR	CI	RR	CI
Very Low	1.97	(1.36, 2.86)	2.815	(1.87, 4.24)			2.25	(1.46, 3.46)
Low	1.59	(1.09, 2.30)	2.07	(1.40, 3.05)	2.95	(1.79, 4.84)	1.65	(1.09, 2.48)
High	1.28	(.850, 1.91)	1.42	(.948, 2.12)	2.03	(1.26, 3.28)	1.13	(0.73, 1.74)
Very High	Reference Category							

High Income: Relative Risk of Fair/Poor Health if All Exposed to Residential SES Neighborhood Compared to if All Exposed to Very Hi SES Residential Neighborhoods								
	Non-Residential Exposures Excluded		Non-Residential Exposures Included					
	Residential SES Effect Only		Residential SES Effect Controlling for Non-Residential Exposure		If all also exposed to Disadvantaged Non-Residential Environments		If all also exposed to Advantaged Non-Residential Environments	
Residential SES	RR	CI*	RR	CI	RR	CI	RR	CI
Very Low	2.04	(1.58, 2.63)	2.49	(1.85, 3.35)			2.03	(1.50, 2.72)
Low	1.61	(1.29, 2.03)	1.87	(1.46, 2.41)	2.06	(1.49, 2.86)	1.51	(1.15, 1.97)
High	1.28	(1.01, 1.60)	1.37	(1.07, 1.72)	1.50	(1.11, 2.03)	1.08	(0.81, 1.45)
Very High	Reference Category							

*95% Confidence Intervals

Table 2: Mean Tract SES difference between Residential and Grocery Store Neighborhoods and Distance Traveled to Grocery Store Predicts BMI

			Total Sample (n=2144)					
	Model A		Model B		Model C		Model D	
	β	p	β	P	β	p	β	p
Residential SES: V. Low			1.51	0.001	2.11	<.0001	2.28	<.0001
Residential SES: Low			1.17	0.006	1.5	.001	1.64	.000
Residential SES: High			.893	0.045	1.05	.018	1.18	.008
Residential SES: V. High			Reference Category					
Disadvantage Score Difference*					.229	.01	.239	.008
Distance between residence and grocery store								
>1.75 miles							.775	.016
1-1.75 miles							.104	.746
0-1 miles							.216	.485
0** miles	Reference Category							
Own Car	.762	.006	.903	.001	.914	0.001	.871	.002
College Educated	-1.32	<.0001	-1.05	.001	-1.09	0.001	-1.13	.000
Black	2.4	<.0001	2.03	<.0001	1.97	<.0001	1.9	<.0001
Latino	1.5	<.0001	1.12	.0001	1.06	0.000	1.06	.000
Married	.267	.243	.355	.123	.381	0.097	.340	.138
Employed	.46	.06	.520	.036	.516	0.037	.54	.03
Log Age Centered	1.73	<.0001	1.65	<.0001	1.65	<.0001	1.66	<.0001
Log Income Centered	.034	.573	.004	.945	.004	0.947	.003	.957
Female	-.333	.135	-.315	.158	-.317	0.154	-.339	.128
Intercept	24.96		23.88		23.65		23.29	
AIC	12921		12914		12910		12908.6	
U_{0j} (p values)	.1746(.1666)		.1761(.1431)		.1228(.206)		0.089(.27)	
R_{ij}	23.82		23.69		23.66		23.3	

*Disadvantage Score Difference between Grocery Store Neighborhood SES area and Residential Neighborhood SES Area. (Negative Score: Grocery store is located in a higher SES area compared to residential area; Positive Score: Grocery store is located in a lower SES area compared to residential area.)

**0 miles implies that grocery store census tract is located in same area as residential census tract.

V. Discussion of Findings

A. Conclusions to be drawn:

In all of our papers, we found that the social and physical contextual environments have a significant effect on health above and beyond individual level factors. These findings add to a growing body of literature that begins to view individuals not as the sole determinants of their health. This is an enormous shift in the typical traditional view of health which identifies individuals as the source of their own health problems and addresses health problems primarily by having individuals change their behavior, resist their environments and work to be different from all the other people around them. Unfortunately, the individual approach to health has many limitations and has achieved only modest successes.

B. Explanation of Limitations

The most important limitation of our study is the cross-sectional nature of the design. We can only find associations and have no way of proving causality.

C. Comparison of Findings with other studies.

The type of analyses and study design we have conducted is still relatively new, but there are increasing numbers of studies examining the built environment. Many of them are looking at physical activity and obesity as outcome variables, others are looking at alcohol related problems and mental health issues. We could not find studies that have been framed in the same way as our studies have been.

D. Possible Applications of findings to actual MCH health care delivery situations

In the traditional health care delivery model, a typical medical history only covers individual habits and symptoms. There is usually no assessment of the residential neighborhood and local environment. Health care providers could review local assets, so patients can be advised to take advantage of them or to find alternatives if resources like parks or healthy food outlets are not available. Rather than provide general advice on a healthy lifestyle, providing specific advice with respect to local resources might be a more effective approach. Most people have little insight into why they behave like they do, and helping them identify that behaviors are frequently a consequence of the available resources may help people in mitigating the disadvantages they may face due to residential location.

E. Policy Implications

Our studies suggest that greater attention should be paid to neighborhood design and assets as a means of health promotion and disease prevention. With respect to obesity, our findings suggest that community level interventions may be effective and that the quality of food available locally may be associated with what people eat and how many calories they consume. This suggests that city planning and business licensing agencies might consider the distribution of outlets in a locality and make efforts to encourage that healthy groceries be made available so that all local residents can find them within a reasonable distance of their homes.

Our findings on collective efficacy a bit mixed. As far as obesity, collective efficacy appears to be protective, but for Latino populations, collective efficacy was associated with higher rates of out of wedlock births. Collective efficacy is likely to be both a response to the social and physical environments as well as a means to shape the social and physical environments. Shaping or improving collective efficacy is likely to be associated with opportunities for people to interact in a safe and positive way. Our models exploring the physical environment suggest that alcohol outlets have a negative impact on collective efficacy while parks have a positive one.

F. Suggestions for further research

Having more detailed data on the social and physical context of many more locations matched to the health outcomes and behaviors of local residents would be very useful to better identify the environmental features that are health promoting. Also, because the data on the environment are essentially ecological data without knowing in which places residents actually spend time or are exposed to, it would be useful to conduct studies on health and local environments by having subjects also wear GPS tracking devices so we can identify exactly the exposures they faced on a daily basis.

List of Products

Peer reviewed articles

1.Cohen, DA, Finch, BK, Bower A, Sastry, N. Collective efficacy and obesity: the potential influence of social factors on health, Social Science and Medicine 2005 (in press)

2. Non-Residential Neighborhood Exposures Suppress Neighborhood Effects on Health by Sanae Inagami, Deborah Cohen, and Brian K Finch (under review)

3. Hispanic Concentration and the Conditional Influence of Collective Efficacy on Teen and Nonmarital Birth Rates: Sandra Way, Brian Finch, Deborah Cohen (under review)

4. Inagami, S, Finch, Cohen, You are where you shop: Residential neighborhoods, body mass index, and grocery store locations.(under review)

5. The Built Environment and Collective Efficacy. Spatial Determinants of Social Interaction: Deborah Cohen, MD, MPH Brian K. Finch, PHD Aimee Bower (under review)

6. Availability of High School Extra-Curricular Sports Programs ; Deborah A. Cohen, MD, MPH, Stephanie L. Taylor, PhD, MPH; Michela Zonta, MA; Katherine D. Vestal, MPH, Mark A. Schuster, MD, PhD (under review)

7.Opportunities for Extra-Curricular Activities at Los Angeles County Public High Schools: Project memorandum PM-1753-CDC-HRSA

Abstracts

Cohen, D, Finch, B and Bower, A: Collective Efficacy and BMI Chronic Disease National Conference on Chronic Diseases Feb 18-20, Wash DC

Cohen, D. Broken Windows and Health: Housing, Collective Efficacy, and Health Outcomes, Abstract #109413 Deborah A. Cohen, MD, MPH, APHA, December 2005, Philadelphia.

Finch, B. "Community Collective Efficacy and Adolescent Health in Los Angeles." 2003 Population Association of America, Minneapolis, May 1-3.

Way, Sandra "Hispanic Concentration and the Conditional Influence of Collective Efficacy on Teen and Non-Marital Birth Rates" Presented at the Pacific Sociological Association Meetings, Portland, OR, April 2005.

Inagami S, Cohen DA, Finch BK Non-Residential Neighborhood Exposures Suppress Neighborhood Effects on Health. . Society of General Internal Medicine Conference. New Orleans. May 14, 2005.

Inagami S, Cohen DA, Finch BK, Asch SM. You Are Where You Shop: Residential Neighborhoods, Grocery Store Locations and Body Mass Index. American Public Health Association Conference. Philadelphia. Scheduled for December 12, 2005

Presentations

Cohen, DA, Special Panel on Childhood Obesity, Academy Health, June 8, 2004

Cohen, DA. Speaker, Public Health and GIS Symposium, University of Pennsylvania, June 21, 2004

Cohen, DA Pennington Biomedical Research Institute, October, 2004

Inagami S, Cohen DA, Finch BK. Non-Residential Neighborhood Exposures Suppress Neighborhood Effects on Health. American Public Health Association Conference. Philadelphia. Scheduled for December 13, 2005.